CLAIMS

1. An image forming method for forming an image using an image forming apparatus comprising:

developing means for containing a two-component developer including toner and carrier;

toner density detecting means for detecting a toner density in the developing means;

humidity detecting means for detecting humidity information around the developing means;

toner supply means for supplying toner to the developing means;

toner supply control means for controlling the toner supply means by comparing an output value from the toner density detecting means with a toner density reference value stored in memory means; and

image density correction control means for forming a reference developing image based on a set value of a predetermined image forming condition, detecting a density of the formed reference developing image, and correcting the set value,

the method being characterized by comprising:

a determination step for determining whether or not a set value of an image forming condition has been corrected beyond a predetermined range with respect to an initial value;

a humidity detection step for detecting humidity by the humidity detecting means when a determination is made in the

determination step that a correction value with respect to the initial value exceeds the predetermined range;

a correction value determination step for determining a correction value of the toner density reference value, based on the humidity detected in the humidity detection step; and

a step of correcting the toner density reference value using the correction value of the toner density reference value determined in the correction value determination step.

2. The image forming method as set forth in claim 1, wherein

the determination step is a first determination step for determining whether or not a correction value with respect to the initial value of the set value of the image forming condition is equal to or larger than a comparative reference value, and further comprises

a second determination step for determining that the correction value is negative when a determination is made in the first determination step that the correction value is not equal to or larger than the comparative reference value, and determining whether or not an absolute value of the correction value is equal to or larger than the comparative reference value, and

the humidity detection step is a step of detecting humidity when a determination is made in the first determination step or the second determination step that the absolute value of the correction value is equal to or larger than the comparative reference value.

3. The image forming method as set forth in claim 2, wherein the comparative reference value differs depending on whether the correction value of the set value of the image forming condition is positive or negative.

4. The image forming method as set forth in claim 2 or 3, further comprising a humidity change determination step for determining whether or not the humidity detected in the humidity detection step has changed and become lower by an amount equal to or larger than a predetermined value from the humidity when the toner density reference value was corrected previously, when a determination is made in the first determination step that the correction value is equal to or larger than the comparative reference value,

wherein when a determination is made in the humidity change determination step that the humidity has changed and become lower by an amount equal to or larger than the predetermined value, a correction value of the toner density reference value is determined based on the changed value to increase a supply amount of toner.

5. The image forming method as set forth in claim 2 or 3, further comprising:

a humidity change determination step for determining

whether or not the humidity detected in the humidity detection step has changed and become lower by an amount equal to or larger than a predetermined value from the humidity when the toner density reference value was corrected previously, when a determination is made in the first determination step that the correction value is equal to or larger than the comparative reference value; and

a step of determining a correction value of the toner density reference value to increase a supply amount of toner, when a determination is made in the humidity change determination step that the humidity change is a change within the predetermined value.

6. The image forming method as set forth in claim 5,

wherein said step is a step of determining the correction value by a correction value of the image forming condition.

7. The image forming method as set forth in claim 2 or 3, further comprising a humidity change determination step for determining whether or not the humidity detected in the humidity detection step has changed and become higher by an amount equal to or larger than a predetermined value from the humidity when the toner density reference value was corrected previously, when a determination is made in the second determination step that the correction value of the image forming condition is negative and the absolute value of the correction value is equal to or larger than the

comparative reference value,

wherein when a determination is made in the humidity change determination step that the humidity has changed and become higher by an amount equal to or larger than the predetermined value, a correction value of the toner density reference value is determined based on the changed value to decrease a supply amount of toner.

8. The image forming method as set forth in claim 2 or 3, further comprising:

a humidity change determination step for determining whether or not the humidity detected in the humidity detection step has changed and become higher by an amount equal to or larger than a predetermined value from the humidity when the toner density reference value was corrected previously, when a determination is made in the second determination step that the correction value of the image forming condition is negative and the absolute value of the correction value is equal to or larger than the comparative reference value; and

a correction value determination step for determining a correction value of the toner density reference value to decrease a supply amount of toner, when a determination is made in the humidity change determination step that the humidity change is a change within the predetermined value.

9. The image forming method as set forth in claim 8,

wherein said step is a step of determining the correction value by a correction value of the image forming condition.

10. The image forming method as set forth in any one of claims 1 through 3 and 7 through 9, wherein

when making a correction to decrease the supply amount of toner, the correction is performed at one time.

11. The image forming method as set forth in any one of claims 1 through 6, wherein

when making a correction to increase the supply amount of toner, the correction is made gradually.

12. The image forming method as set forth in any one of claims 1 through 11, further comprising a step of determining whether or not a detection value outputted by the toner density detecting means has reached the toner density reference value after correction, when the toner density reference value is corrected,

wherein when a determination is made in said step that the detection value has reached the toner density reference value after correction, the correction of the toner density reference value is executed.

13. The image forming method as set forth in any one of

claims 1 through 12, further comprising a step of determining whether or not a detection value outputted by the toner density detecting means has reached the toner density reference value after correction, when the toner density reference value is corrected,

wherein when a determination is made in said step that the detection value has reached the toner density reference value after correction, the correction of the set value of the image forming condition is executed.

14. The image forming method as set forth in any one of claims 1 through 13, further comprising:

a step of storing a developer agitation time since an initial time of the developer contained in the developing means; and

a step of correcting the toner density reference value using a correction value corresponding to the developer agitation time stored in said step.

15. The image forming method as set forth in any one of claims 1 through 14, wherein

the correction of the image forming condition is one or a plurality of corrections on a development bias voltage value applied to develop an electrostatic latent image, a charging voltage value for charging a photoreceptor, a transfer voltage value for transferring the developing image to a transfer material, and an exposure amount for exposing the photoreceptor.

16. The image forming method as set forth in any one of claims 1 through 15, further comprising:

a step of measuring an elapsed time since forming an image;

a step of determining whether or not the measured elapsed time exceeds a predetermined time; and

a step of determining a correction value of the toner density reference value based on the elapsed time, regardless of an output value from the toner density detecting means, when a determination is made in the determination step that the elapsed time exceeds the predetermined time.

17. The image forming method as set forth in any one of claims 1 through 15, further comprising:

a step of measuring an elapsed time since forming; and

a step of determining a correction value of the toner density reference value, based on a previous output value from the toner density detecting means and the elapsed time.

18. The image forming method as set forth in any one of claims 1 through 17, further comprising:

a step of measuring a continuous supply time in which the toner is continuously supplied since the start of toner supply;

a step of determining whether or not the measured continuous supply time exceeds a predetermined time; and

a step of restricting forming an image, when a determination is made in the determination step that the continuous supply time exceeds the predetermined time.

19. The image forming method as set forth in any one of claims 1 through 18, further comprising:

a step of measuring an accumulated elapsed time required for an image forming process after supplying the toner;

a step of determining whether or not the measured accumulated elapsed time exceeds a predetermined time; and

a step of starting to supply a predetermined amount of toner by the toner supply means, regardless of an output value from the toner density detecting means, when a determination is made in the determination step that the accumulated elapsed time exceeds the predetermined time.

20. The image forming method as set forth in claim 19, further comprising:

a step of returning the accumulated elapsed time to an initial value without supplying toner, when the output value of the toner density detecting means is smaller than the toner density reference value determined in the correction value determination step by a predetermined amount.

21. The image forming method as set forth in claim 19,

further comprising:

a step of returning the accumulated elapsed time to an initial value when the correction value of the toner density reference value determined in the correction value determination step is positive.

22. The image forming method as set forth in claim 19, further comprising:

a step of interrupting the measurement of the accumulated elapsed time until the toner density detected by the toner density detecting means reaches the toner density reference value after correction, after supplying toner by the toner supply means based on the toner density reference value after correction, when the correction value of the toner density reference value determined in the correction value determination step is positive.

23. The image forming method as set forth in any one of claims 1 through 22, wherein

an average particle diameter of toner is within a range of 4 to 7 μm.

24. The image forming method as set forth in any one of claims 1 through 23, wherein

a content of pigment in toner is within a range of 8 to 20 %.

25. An image forming apparatus including:

developing means for containing a two-component developer including toner and carrier;

toner density detecting means for detecting a toner density in the developing means;

humidity detecting means for detecting humidity information around the developing means;

toner supply means for supplying toner to the developing means;

toner supply control means for controlling the toner supply means by comparing an output value from the toner density detecting means with a toner density reference value stored in memory means; and

image density correction control means for forming a reference visible image based on a set value of a predetermined image forming condition, detecting a density of the formed reference visible image, and correcting the set value,

the apparatus being characterized by comprising:

means for determining whether or not a set value of an image forming condition has been corrected beyond a predetermined range with respect to an initial value;

means for detecting a humidity change by monitoring an output of the humidity detecting means, when said means determines that a correction value with respect to the initial value exceeds the predetermined range;

means for determining a correction value of the toner density reference value, based on the humidity change detected by said means; and

means for correcting the toner density reference value using the correction value determined by said means.

26. The image forming apparatus as set forth in claim 25, comprising a developing device for containing developers of a plurality of colors.

27. The image forming apparatus as set forth in claim 25 or 26, comprising detachable toner container means for storing toner to be supplied by the toner supply means,

wherein the toner container means includes a recording unit for recording information about use status.

28. The image forming apparatus as set forth in claim 27, comprising:

means for measuring an accumulated time required for supply by the toner supply means; and

means for recording the use status based on the measured accumulated time in the recording unit of the toner container means.

29. The image forming apparatus as set forth in claim 27 or

28, comprising:

means for reading the information about the use status recorded in the recording unit of the toner container means; and

means for changing a preset operating condition when the read information about the use status is information indicating an unused status.